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UREDINALES COLLECTED BY R. THAXTER AND J. B. RORER IN TRINIDAD¹

J. C. ARTHUR

(WITH FOUR FIGURES)

During a visit to Trinidad extending from December 19, 1912, to May 16, 1913, made by Dr. ROLAND THAXTER of Harvard University for the purpose of collecting insects and fungi, especially Pyrenomycetes, a number of Uredinales were secured, chiefly in the latter half of the period. The island of Tobago was also visited for a day in May. This island lies about thirty miles northeast of Trinidad, and geographically is to be considered with it in a study of the flora. The two islands lie close to the northern coast of South America, and in their faunal and floral relations belong to that continent.

The Uredinales, consisting of about forty-five numbers, including two from Tobago, were recently submitted to the writer for study by THAXTER. They have been found to represent thirty-seven species of rusts, and to fall into the unusually large percentage of fourteen genera. Two of the species appear to be undescribed, and one of these seems sufficiently distinctive to be the type of a new genus.

Little is known of the rusts of Trinidad, and the independent publication of this interesting list of species appears to be worth while. A few numbers have been added, which were collected in 1915 and 1916 and sent to the writer by Mr. JAMES B. RORER, Mycologist to the Board of Agriculture of Trinidad from 1909 to 1918, and earlier assistant in botany at Harvard University. He sent four numbers, which show the same high percentage of species and genera as those from THAXTER, there being four species, one of them a most interesting undescribed form, and three genera. All of the species and two of the genera are unrepresented in the THAXTER collection.

¹ Contribution from the Botanical Department of Purdue University Agricultural Experiment Station.

In the following list nos. 6, 8, 14, 18, 19, 20, 30-36, thirteen in all (that is, 30 per cent) are short cycle species, while the others drop into various categories of long cycle species, five of them, nos. 1, 17, 23, 26, and 28, being actually or potentially heteroecious. Altogether the list embraces forty-three species of rusts, under sixteen genera, an excellent beginning to the study of the Uredinales of Trinidad and its adjacent islands.

For those species which have received treatment in the seventh volume of the *North American Flora* reference is made to the page where the description and synonymy occur; for the other species reference is given to the place of the original description. Thanks are especially due to Dr. THAXTER and Mr. RORER for the drawing and photographs included in this paper, illustrating two of the new species.

1. *COLEOSPORIUM IPOMOEAE* (Schw.) Burr. N.A.F. 87.—On *Ipomoea glabra* (Aubl.) Choisy, St. Anns Valley, February 1913, II, Thaxter 4.

Somewhat common throughout the West Indies in its uredinial stage.

2. *PHAKOPSORA CROTONIS* (Cooke) Arth. N.A.F. 104.—On *Croton gossypifolium* Vahl. La Seiva Valley, May 5, 1913, II, Thaxter 43.

3. *PHAKOPSORA VITIS* (Thüm.) Sydow, N.A.F. 102 (*Uredo Vitis* Thüm.).—On cultivated grape (*Vitis* sp.), Port of Spain, October 1916, II, Rorer.

4. *CEROTELIUM FICI* (Cast.) Arth. Bull. Torr. Bot. Club 44: 509. 1917.—On *Ficus radula* Willd., Maraval Valley, May 14, 1913, II, Thaxter.

5. *Cerotelium minutum*, sp. nov.

II. Uredinia hypophyllous, more or less grouped on discolored spots, hidden in the pubescence of the host, small, 0.1-0.3 mm. in diameter, soon naked, pulverulent, pale yellow becoming colorless; peridium and paraphyses wanting; urediniospores obovoid or globoid, small, 14-16×17-23 μ ; wall pale yellow or colorless, thin, 1 μ or less, sparingly and prominently echinulate, the pores obscure.

III. Telia hypophyllous, hidden by the pubescence, minute, 0.03-0.08 mm. in diameter, erumpent, forming columns about

30–50 μ high, fuscous; teliospores catenulate, adhering laterally to form a cylindric column, ellipsoid or cuboid, 12–14 \times 13–16 μ ; wall pale cinnamon-brown, uniformly thin, 1 μ or less, smooth.

On an undetermined Bignoniaceous vine, La Seiva Valley, April 1913, II, iii, *Thaxter* 38.

The host has large trumpet-shaped flowers and large, ovate, pointed leaves, pale with dense pubescence beneath. The rust is unusually minute. The presence of telia was pointed out by THAXTER, who supplied a microscope slide with sections showing the telial structure.

Maravalia, gen. nov.

Cycle of development includes telia, and possibly pycnia.

Telia subepidermal, erumpent, somewhat indefinite. Teliospores free, one-celled, with apical germination, pedicellate; wall colorless, thin, smooth.

6. **Maravalia pallida** Arthur and Thaxter, sp. nov.

O. Pycnia unknown, probably not formed.

III. Telia hypophyllous, numerous in circular areas 5–10 mm. across on somewhat larger yellowish spots, at first pulvinate, roundish, 0.2–0.4 mm. across, becoming larger, elongate and branched, somewhat confluent, early naked, yellowish becoming white, velvety by germination, ruptured epidermis erect or somewhat overarching; teliospores elongate-oblong, clavate-oblong, or cylindroid, 13–22 \times 58–67 μ , rounded at both ends or narrowed below, germinating upon maturity; wall colorless, uniformly very thin, about 0.5 μ , smooth; pedicel slender, 8–10 μ in diameter, 20–35 μ long, colorless.

On *Pithecolobium latifolium* (L.) Benth. (*Zygia latifolia* St. Hil.), Maraval Valley, April 1913, *Thaxter*.

The genus differs from *Chaconia*, established by JUEL for a white rust on *Pithecolobium divaricatum* (Bong.) Benth., from Paraguay, by the mode of origin of the spores. Both are short cycle species; in *Chaconia* the spores are sessile and clustered on a large basal cell, while in *Maravalia* they are pedicelled and arise directly from the hymenial layer of hyphae in the same manner as is usual in the large majority of rusts (fig. 1). The genus is apparently a short cycle condition of the genus *Spirechina*. *M. pallida* much resembles in gross appearance *S. epiphylla*, a Texan rust on *Rubus*. In its teliospores it also much resembles *S. epiphylla*, and there is even a closer resemblance to those of *S. Pittieriana*, another *Rubus* rust from Costa Rica. Figs. 1 and 2 well illustrate the structure and habit of the rust.

7. **Milesia Blechni** (Sydow), comb. nov. (*Melampsorella Blechni* Sydow, Ann. Myc. 1:537. 1903; *Uredo Blechni* Diet. and Neg., Engler's Jahrb. 22:358. 1896).—On *Lygodium polymorphum* (Cav.) H.B.K., St. Anns Valley, February 20, 1913, II, *Thaxter* 45.

A common rust in Europe, and also known from Chile. The host is new for the species. Special interest attaches to the group of fern rusts to which this one belongs, as probably representing the most primitive characters of Melampsoraceae, and possibly of all the rusts as well.

8. **CIONOTHRIX PRAELONGA** (Wint.) Arth. N.A.F. 124.—On *Eupatorium odoratum* L., La Seiva Valley, April 1913, *Thaxter* 41.

A common short cycle rust occurring throughout tropical America on various species of *Eupatorium*.

9. **RAVENELIA INDIGOFERAE** Tranz. N.A.F. 144.—On *Indigo-fera suffruticosa* Mill. (*I. Anil* L.), Roxborough, Tobago, May 8-9, 1913, II, *Thaxter* 25.

10. **DICHEIRINIA BINATA** (Berk.) Arth. N.A.F. 147 (*Uredo Cabreriana* Kern and Kellerm.).—On *Erythrina umbrosa* H.B.K., Palmiste, San Fernando, October 24, 1916, II, *Rorer*.

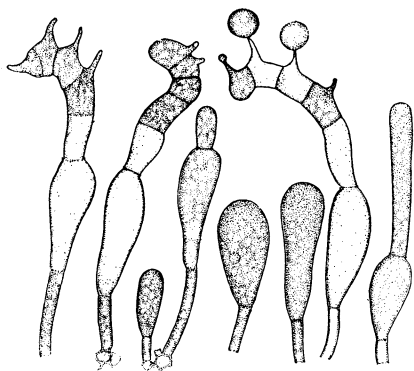


FIG. 1.—Young and mature teliospores of *Maravalia pallida*, the latter germinating.

"The host is called Anauca Immortal, and is used to shade cacao. The rust attacks not only the leaf blades, but the midribs and petioles, sometimes causing distortion," as writes Mr. RORER. It is not uncommon in other West Indian islands and in Central America.

11. **CTENODERMA CRISTATUM** (Speg.) Sydow, Ann. Myc. 17:103. 1919 (*Uromyces Cupaniae* Arth. and Johnst.).—On *Cupania americana* L., Maraval Valley, April 1913, III, *Thaxter* 40.

12. **DESMELLA GYMNOGRAMMES** (P. Henn.) Sydow, Ann. Myc. 16:242. 1918.—On *Adiantum latifolium* Lam., Maraval Valley, March 1913, II, *Thaxter* 44; *Cyclopeltis semicordata* (Sw.) J. Sm., Maraval Valley, 1913, II, *Thaxter* 46.

This is a common fern rust in its uredinial stage throughout tropical America on many genera of ferns. It has been reported from Porto Rico on the first named host, but the second host is a new record. The teliospores have recently come to light on a collection from Brazil of *Lygodium polymorphum* (Cav.) H.B.K. in the National Herbarium. I am indebted to Mr. W. R. MAXON for the opportunity of studying this interesting material, and

also for his kindness in determining the ferns mentioned in this paper. The genus *Desmella* possesses by far the most primitive characters of any rusts known in the family Aecidiaceae (Pucciniaceae), and consequently its members have unusual interest for the student of Uredinales evolution.

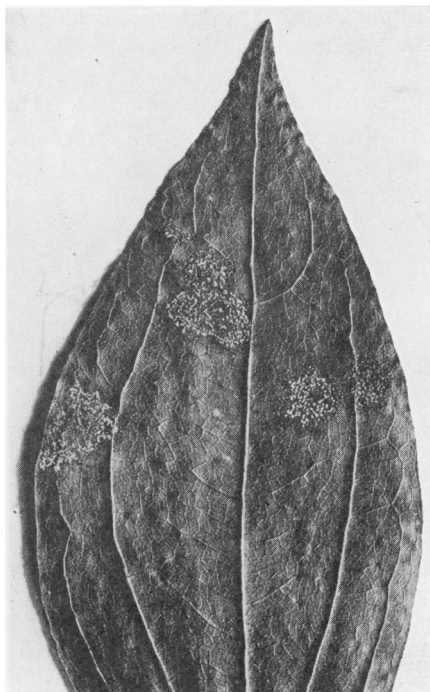


FIG. 2.—Leaf of *Pithecolobium latifolium* showing groups of sori of *Maravalia pallida*, nearly natural size.

13. *UROMYCES COLUMBIANUS* Mayor, Mém. Soc. Neuch. 5:467. 1913.—On *Melanthera aspera* (Jacq.) Steud., Manzanilla Beach, 1913, II, *Thaxter* 33; Maraval Valley, 1913, i, II, *Thaxter* 34.

14. *UROMYCES JAMAICENSIS* Vesterg. Ark. Bot. Stockh. 4¹⁵:33. 1905.—On *Bauhinia Pauletia* Pers., St. Anns Valley, March-April 1913, *Thaxter* 20a; La Seiva Valley, April-May 1913, *Thaxter* 20b.

A short cycle species known heretofore only from the North American West Indies and Mexico.

15. *UROMYCES WULFFIAE-STENOGLOSSAE* Diet. Ann. Myc. 6:96. 1908.—On *Wulffia baccata* (L.f.) Kuntze, St. Anns Valley, 1913, III, *Thaxter* 35; La Seiva Valley, 1913, III, *Thaxter* 36.

16. *PUCCINIA ACNISTI* Arth. N.A.F. 471.—On *Acnistus arborescens* Schlecht., Maraval Valley, 1913, I, *Thaxter* 23.

17. PUCCINIA ANTIOQUINENSIS Mayor, N.A.F. 347.—On *Cyperus diffusus* Vahl, Sangre Grande, April 1913, III, *Thaxter* 51.

18. PUCCINIA ARECHAVALETAE Speg. Ann. Soc. Ci. Arg. 12:67. 1881.—On *Urvillea Seriana* (L.) H.B.K., St. Claire, Port of Spain, February–April 1913, *Thaxter* 28.

19. **Puccinia corticola** Arthur and Rorer, sp. nov.

O. Pycnia amphigenous, rather few, seen in groups of 2 or 3, inconspicuous, subepidermal, flask-shaped, $74\text{--}96\mu$ broad by $110\text{--}115\mu$ high; ostiolar filaments agglutinated.

III. Telia amphigenous and caulicolous, on leaves and young twigs, few, scattered, confluent in groups of 6–8 or more, on leaf blades rounded, on midribs and stems oblong or lenticular, 0.2–1.3 mm. long, on trunk and branches much larger, rather early naked, dark brown, pulverulent, ruptured epidermis evident; teliospores ellipsoid, $19\text{--}24 \times 30\text{--}42\mu$, rounded above and below, slightly or not constricted at septum; wall cinnamon or chestnut brown, $2\text{--}2.5\mu$ thick, slightly thicker at apex, coarsely and sparsely verrucose, the markings more pronounced above, pedicel colorless, fragile.

On *Cordia Gerascanthus* L. (Ehretiaceae), Arima Forest Reserve, December 1915, *Rorer*.

The host, Mr. RORER writes, is “a timber tree, which yields a wood known as Cypre. The disease is of economic importance here, as it not only attacks the leaves and young twigs, but the older branches as well, and causes large lesions on the main trunk of the tree.” Figs. 3 and 4 show the injury to five year old trees. This interesting short cycle species is the only rust in *Puccinia* known to attack the trunks and larger branches of trees, although some species of *Gymnosporangium* show such behavior.

20. PUCCINIA EUPATORII DIET. Hedwigia 36:32. 1897.—On *Eupatorium iresinoides* H.B.K., Diego Martin, 1913, *Thaxter* 32.

21. PUCCINIA GOUANIAE Holway, Ann. Myc. 3:21. 1905.—On *Gouania polygama* (Jacq.) Urban, Maraval Valley, March 1913, II, *Thaxter* 30a; Roxborough, Tobago, May 8–9, 1913, II, iii, *Thaxter* 30b.

22. PUCCINIA HELICONIAE (Diet.) Arth. Bull. Torr. Bot. Club 45:144. 1918.—On *Bihai Psittacorum* (L.) Kuntze (*Heliconia Psittacorum* L.), La Seiva Valley, April 1913, II, *Thaxter* 11.

23. *Puccinia* (?) *ignava* (Arth.), comb. nov. (*Uredo ignava* Arth.), N.A.F. 341.—On *Dendrocalamus giganteus* Munro (?), Maraval Valley, March 1913, II, *Thaxter* 49.



FIG. 3.—Base of trunk of a five-year-old tree of *Cordia Gerascanthus*, showing severe injury caused by *Puccinia corticola*.

The host is an introduced bamboo, and one not before recorded for the rust. The name is transferred to *Puccinia* for convenience of listing. There

is large probability that when the teliospores are found they will justify this change.



FIG. 4.—Trunk of five-year-old tree of *Cordia Gerascanthus*, showing lesions made by *Puccinia corticola*.

24. PUCCINIA INVAGINATA Arth. and Johnston, Mem. Torr. Club 17: 146. 1918.—On *Gouania polygama* (Jacq.) Urban, St. Anns Valley, May 3, 1913, II, III, Thaxter 29.

Heretofore known from the North American West Indies and Guatemala, but not from South America.

25. PUCCINIA LEONOTIDIS (P. Henn.) Arth. N.A.F. 407.—On *Leonotis nepetaefolia* (L.) R. Br., Maraval Valley, March 1913, II, *Thaxter* 10.

Only the uredinia of this common tropical rust are known in America.

26. PUCCINIA PURPUREA Cooke, N.A.F. 284.—On Guinea corn, *Holcus Sorghum* L., Port of Spain, September 1916, II, *Rorer*.

27. PUCCINIA RUELLIAE (Berk. and Br.) Lagerh. N.A.F. 415.—On *Blechum Brownei* Juss., La Seiva Valley, 1913, II, *Thaxter* 2; *Dianthera pectoralis* (Jacq.) Gmel. (*Justicia pectoralis* Jacq.), Port of Spain, 1913, II, *Thaxter* 3.

28. PUCCINIA SCLERIAE (Paz.) Arth. N.A.F. 349.—On *Passiflora tuberosa* Jacq., St. Anns Valley, February-March 1913, I, *Thaxter* 18; *Scleria* sp., Sangre Grande, April 1913, II, *Thaxter* 52.

Cultures establishing the relation of the alternate hosts of this species were made by Mr. H. E. THOMAS in Porto Rico in 1917 (Phytopath. 8:163-164, 1918).

29. PUCCINIA SMILACIS Schw. N.A.F. 377.—On *Smilax cumanensis* Willd. (?), La Seiva Valley, March-April 1913, II, *Thaxter* 17.

Not before reported for the South American region.

30. PUCCINIA SPEGAZZINII DeToni, in Sacc. Syll. Fung. 7:704. 1888.—On *Mikania* sp., Maraval Valley, April 1913, *Thaxter* 7.

31. PUCCINIA SYNEDRELLAE P. Henn. Hedwigia 37:277. 1898.—On *Emilia sonchifolia* (L.) DC., La Seiva Valley, April-May 1913, *Thaxter* 22; *Synedrella nodiflora* (L.) Gaertn., Sangre Grande, April 1913, *Thaxter* 42.

32. PUCCINIA TRIUMFETTAE Dietel and Holway; Holway, Bot. GAZ. 24:30. 1897.—On *Triumfetta* sp., Maraval and La Seiva Valley, April-May 1913, *Thaxter*.

Heretofore scantily represented by collections from southern Mexico and Ecuador. The collection here cited also bore *Puccinosira pallidula* rather intimately associated on the same leaves.

33. ENDOPHYLLUM GUTTATUM (Kunze) Sydow, Ann. Myc. 17:179. 1920 (*E. circumscriptum* Whetzel and Olive).—On *Cissus sicyoides* L., Sangre Grande, February 1913, *Thaxter* 24.

34. ENDOPHYLLUM PUMILIO (Kunze) Sydow, Ann. Myc. **17**:179. 1920. (*E. decoloratum* Whetzel and Olive).—On *Clibadium surinamense* L., Maraval Valley, 1913, *Thaxter* 37.

35. ENDOPHYLLUM WEDELIAE (Earle) Whetzel and Olive, Amer. Jour. Bot. **4**:49. 1917.—On *Wedelia trilobata* (L.) Hitchc., Manzanilla Beach, March 1913, *Thaxter* 5b.

36. PUCCINIOSIRA PALLIDULA (Speg.) Lagerh. N.A.F. 127.—On *Triumfetta* sp. Maraval Valley, 1913, *Thaxter* 27. Also associated with *Puccinia Triumfettae* in another collection.

37. UREDO ADENOCALYMMATIS P. Henn. Hedwigia **35**:249. 1896.—On Bignoniaceae, La Seiva Valley, April 1913, *Thaxter* 39.

38. UREDO CHERIMOLIAE Lagerh. Bull. Soc. Myc. Fr. **11**:215. 1895.—On *Rollinia multiflora* Splitg., La Seiva Valley, *Thaxter* 14.

A new host for this common Anonaceous rust.

39. UREDO MANDEVILLAE Mayor, Mém. Soc. Neuch. **5**:591. 1913.—On *Mandevilla tomentosa* (Vahl) Kuntze, Aripo Savanna, April 1913, *Thaxter* 9a; La Seiva Valley, April 1913, *Thaxter* 9b.

40. UREDO PHYLLANTHI P. Henn. Hedwigia **35**:248. 1896.—On *Phyllanthus Conami* Sw. (*P. acuminatus* Vahl), Maraval Valley, March 1913, *Thaxter* 31.

The species has previously been recorded from the vicinity of Rio de Janeiro, Brazil.

41. UREDO RUBESCENS Arth. Mycologia **7**:327. 1915.—On *Dorstenia Contrajerva* L., Maraval Valley, January 1913, *Thaxter* 13.

Also known from Porto Rico and Guatemala.

42. UREDO SABICEICOLA Arth. Mycologia **7**:323. 1915.—On *Sabicea aspera* Aubl., La Seiva Valley, March-April 1913, *Thaxter* 19a, b.

Heretofore only known from Porto Rico.

43. AECIDIUM BRASILIENSE Diet. Hedwigia **36**:35. 1897.—On *Cordia* sp., Maraval Valley, 1913, *Thaxter* 15, 16.

Previously reported from southern Brazil.

INDEX TO UREDINALES

- Aecidium brasiliense* 43
Cerotelium Fici 4
 minutum 5
Cionothrix praelonga 8
Coleosporium Ipomoeae 1
Ctenoderma cristatum 11
Desmella Gymnogrammes 12
Dicheirinia binata 10
Endophyllum circumscriptum 33
 decoloratum 34
 guttatum 33
 pumilio 34
 Wedeliae 35
Maravalia pallida 6
Melampsorella Blechni 7
Milesia Blechni 7
Phakopsora Crotonis 2
 Vitis 3
Puccinia Acnisti 16
 antioquinensis 17
 Arechavaletae 18
 corticola 19
 Eupatorii 20
 Gouaniae 21
 Heliconiae 22
 ignava 23
 invaginata 24
 Leonotidis 25
 purpurea 26
 Ruelliae 27
 Scleriae 28
 Smilacis 29
 Spegazzinii 30
 Synedrellae 31
 Triumfettae 32, 36
Puccinosira pallidula 32, 36
Ravenelia Indigoferae 9
Uredo Adenocalymmatidis 37
 Cabreriana 10
 Blechni 7
 Cherimoliae 38
 ignava 23
 Mandevillae 39
 Phyllanthi 40
 rubescens 41
 sabiceicola 42
 Vitis 3
Uromyces columbianus 13
 Cupaniae 11
 jamaicensis 14
 Wulffiae-stenoglossae 15

HOST INDEX

- Acnistus arborescens* 16
Adiantum latifolium 12
Bauhinia Pauletia 14
Bignoniaceae 5, 37
Bihai Psittacorum 22
Blechnum Brownei 27
Cissus sicyoides 33
Clibadium surinamense 34
Cordia Gerascanthus 19
 sp. 43
Croton gossypifolium 2
Cupania americana 11
Cyclopeltis semicordata 12
Cyperus diffusus 17
Dendrocalamus giganteus 23
Dianthera pectoralis 27
Dorstenia Contrajerva 41
Ehretiaceae 19
Emilia sonchifolia 31
Erythrina umbrosa 10
Eupatorium iresinoides 20
 odoratum 8
Ficus radula 4
Gouania polygama 21, 24
Heliconia Psittacorum 22
Holcus Sorghum 26

Indigofera suffruticosa 9	Rollinia multiflora 38
Ipomoea glabra 1	Sabicea aspera 42
Justicia pectoralis 27	Scleria sp. 28
Leonotis nepetaefolia 25	Smilax cumanensis 29
Lygodium polymorphum 7	Synedrella nodiflora 31
Mandevilla tomentosa 39	Triumfetta sp. 32, 36
Melanthera aspera 13	Urvillea Seriana 18
Mikania sp. 30	Vitis sp. 3
Passiflora tuberosa 28	Wedelia trilobata 35
Phyllanthus acuminatus 40	Wulffia baccata 15
Conami 40	Zygia latifolia 6
Pithecolobium latifolium 6	

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